## Quadrilaterals in the Coordinate Plane

**A)**  **Given the vertices of a quadrilateral, it can be classified by characterizing its sides.**
You start by calculating the length and slope of each side.

Classify quadrilateral LION with vertices L(–5, –2), I(1, 2), O(3, –1), N(–3, –5)
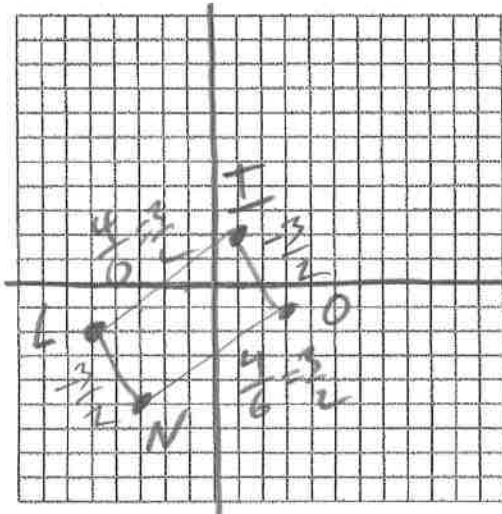
$\sqrt{4^2+6^2} \neq \sqrt{3^2+3^2}$

$LI \neq ON$

Rectangle

○ opposite sides are equal

• consecutive sides are negative reciprocals

**B)**  **A quadrilateral can also be classified by characterizing its diagonals.**
You start by calculating the length, slope, and midpoints of each diagonal.

Classify quadrilateral TIGR, with vertices T(–3, 4), I(–1, 5), G(2, –1), R(0, –2)
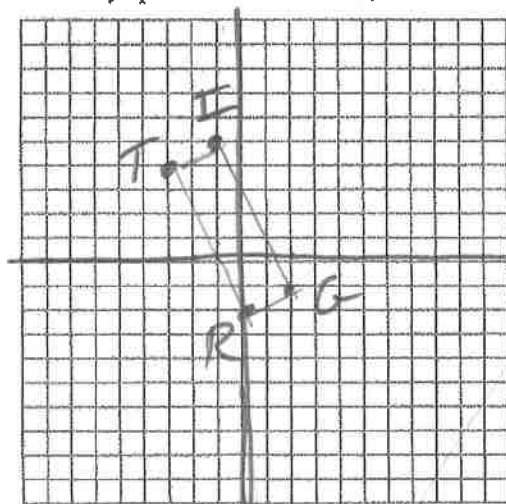
| | slope | distance |
|---|---|---|
| TG | $-\frac{5}{5}$ | $\sqrt{5^2+5^2}=\sqrt{50}$ |
| IR | $-\frac{7}{1}$ | $\sqrt{7^2+1}=\sqrt{50}$ |

not 90°          same length

i.e.
not perpendicular

Midpoints

TG — (-0.5, 1.5)

IR — (-.5, 1.5)

→ rectangle !
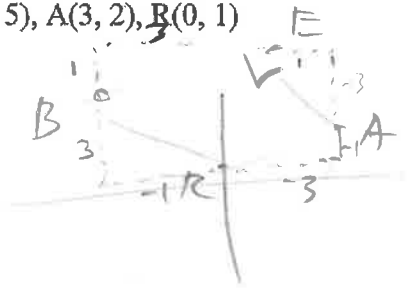
## Quadrilaterals in the Coordinate Plane

A)    Classify these quadrilaterals by calculating the length and slope *of the sides* and determining the shape *based on these calculations only*.

*Problem 1*: Classify quadrilateral BEAR, where B(–1, 4), E(2, 5), A(3, 2), R(0, 1)

length        slope

BE    $\sqrt{3^2 + 1^2}$        $\frac{1}{3} = \frac{1}{3}$

EA    $\sqrt{(-3)^2 + 1^2}$        $\frac{-3}{1} = \frac{-3}{1}$

AR    $\sqrt{(-1)^2 + (-3)^2}$        $\frac{-1}{-3} = \frac{1}{3}$

RB    $\sqrt{3^2 + (-1)^2}$        $\frac{3}{-1} = \frac{-3}{1}$
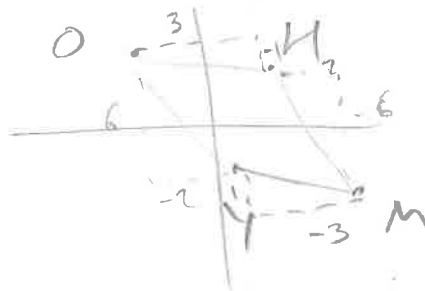
All equal length!        All angles 90°!        SQUARE

*Problem 2*: Classify quadrilateral OHMY, where O(–1, 4), H(2, 3), M(4, –3), Y(1, –2)

length        slope

OH    $\sqrt{(3)^2 + (-1)^2}$        $\frac{-1}{3} = \frac{-1}{3}$

HM    $\sqrt{(6)^2 + (2)^2}$        $\frac{-6}{2} = \frac{-3}{1}$

MY    $\sqrt{(3)^2 + (1)^2}$        $\frac{1}{-3} = \frac{-1}{3}$

YO    $\sqrt{6^2 + (-2)^2}$        $\frac{6}{-2} = \frac{-3}{1}$

opposite sides equal        all 90°!        Rectangle

B) Classify these quadrilaterals by calculating the length, slope, and midpoints *of the diagonals* and determining the shape *based on these calculations only*.

**Problem 3**: Classify quadrilateral WZRD, where W(0, 3), Z(5, 3), R(8, –1), D(3, –1)

| | slope | length | Midpoint |
|---|---|---|---|
| WR | $-\frac{4}{8}$ | $\sqrt{4^2+8^2}$ | 4 , 1 |
| DZ | $+\frac{4}{2}$ | $\sqrt{4^2+2^2}$ | 4 , 1 |

perpendicular

not
same
length

Same
midpt
thus
bisected



Rhombus

**Problem 4**: Classify quadrilateral AHSZ, where A(–2, 1), H(2, 2), S(5, –4), Z(1, –5)

| | slope | length | Midpoint |
|---|---|---|---|
| AS | $-\frac{5}{7}$ | $\sqrt{5^2+7^2}$ | 1.5 , -1.5 |
| HZ | $\frac{7}{1}$ | $\sqrt{7^2+1^2}$ | 1.5 , -1.5 |



statement
made

not
perpendicular

not
equal

Same!

conclusion       Parallelogram

*Geometry*

NAME: _____

**WORKSHEET:** *Quadrilaterals in the Plane*

PERIOD: _____   DATE: _____

## ALL OF THE FOLLOWING INFORMATION WAS FOUND USING THE COORDINATES OF THE VERTICES OF A QUADRIALATERAL.
## USE THIS INFORMATION TO CLASSIFY EACH QUADRILATERAL AS A:

SQUARE...RECTANGLE...RHOMBUS...TRAPEZOID...ISOSCELES TRAPEZOID...KITE...
OR JUST A GENERIC PARALLELOGRAM OR A GENERIC QUADRILATERAL

1)   Classify quadrilateral **BEAR**, where:

Slope of $\overline{BE} = \dfrac{1}{3}$

Slope of $\overline{EA} = -3$

Slope of $\overline{AR} = \dfrac{1}{3}$

Slope of $\overline{BR} = -3$

**BEAR** is a _____ *Squre*

Length of $\overline{BE} = \sqrt{10}$

Length of $\overline{EA} = \sqrt{10}$

Length of $\overline{AR} = \sqrt{10}$

Length of $\overline{BR} = \sqrt{10}$

2)   Classify quadrilateral **OHMY**, where:

Slope of $\overline{OH} = -\dfrac{1}{3}$

Slope of $\overline{HM} = -3$

Slope of $\overline{MY} = -\dfrac{1}{3}$

Slope of $\overline{OY} = -3$

**OHMY** is a _____ *rectangle*

Length of $\overline{OH} = \sqrt{10}$

Length of $\overline{HM} = 2\sqrt{10}$

Length of $\overline{MY} = \sqrt{10}$

Length of $\overline{OY} = 2\sqrt{10}$

3)   Classify quadrilateral **WZRD**, where:

Slope of $\overline{WZ} = 0$

Slope of $\overline{ZR} = -\dfrac{4}{3}$

Slope of $\overline{RD} = 0$

Slope of $\overline{WD} = -\dfrac{4}{3}$

*all* *//*

**WZRD** is a _____ *rhombus*

Length of $\overline{WZ} = 5$

Length of $\overline{ZR} = 5$

Length of $\overline{RD} = 5$

Length of $\overline{WD} = 5$

4)   Classify quadrilateral **AHSZ**, where:

Slope of $\overline{AH} = \dfrac{1}{4}$

Slope of $\overline{SZ} = \dfrac{6}{7}$

Slope of $\overline{HS} = -4$

Slope of $\overline{ZA} = \dfrac{9}{2}$

**AHSZ** is a _____ *kite*

Length of $\overline{AH} = \sqrt{17}$

Length of $\overline{SZ} = \sqrt{85}$

Length of $\overline{HS} = \sqrt{17}$

Length of $\overline{ZA} = \sqrt{85}$